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ABSTRACT

The term Chisanbop is the trademark for the finger calculation method originally developed by a Korean, Sung Jin Pai. It was refined and simplified by his son, Hang Young Pai, who introduced the technique to the United States in 1976. This annotated bibliography has been organized in five categories. Readings in the first category, Historical Background of Finger Counting Systems, give information about the way past civilizations used fingers to meet mathematical needs. The second, Instructional Materials, provides a list of materials which are presently being used in schools and homes to instruct beginners in finger calculation. The articles annotated in Informational Articles have appeared in journals to give the public a "bird's eye view" of this unconventional teaching method. Reactions has been chosen as a follow-up to the first three categories. The selections in this section include articles written by experts, in the field of mathematics or other educational areas, who have evaluated the Chisanbop program. After becoming aware of the Chisanbop method through the categories mentioned, it is hoped that from the data collected in the final category, Research Findings, some generalizations about its effectiveness can be made. (Author/MK)

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AN ANNOTATED BIBLIOGRAPHY ON THE CHISANBOP METHOD OF FINGER CALCULATION

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INTRODUCTION

The term Chisanbop has been chosen as the trademark for the finger calculation method originally developed by a noted Korean, Sung Jin Pai. It was refined and simplified by his son, Hang Young Pai, who introduced the technique to the United States in 1976. Chisanbop received national attention through television exposure in late 1977 and 1978. Interest grew among American educators. Since that time, Chisanbop has been used as a supplemental mathematics program in kindergarten through grade twelve. The method, which is multi-sensory in its approach, has been taught to children at all levels: gifted, average, slow and handicapped.

Articles evaluating Chisanbop have been written in educational journals. Controversies, regarding the validity of the method and the training of its instructors, have arisen among educators. Research studies in this field have been initiated.

The Chisanbop method of finger calculation has been introduced in some of the South Bend, Indiana and Mishawaka, Indiana schools. The interest among educators in these cities to attend teacher certification workshops has grown. Chisanbop, the topic of this annotated bibliography, was selected in order to identify and examine its strengths and weaknesses.

The annotated bibliography has been organized in five categories. Readings in the first category, Historical Background of Finger Counting Systems, have given information about the way past civilizations have used fingers to meet mathematical needs. The second, Instructional Materials, has provided a list of materials which are presently being used in schools and homes to instruct beginners in finger calculation techniques. The articles annotated in Informational Articles have appeared in journals to give the public a "bird's eye view" of this unconventional teaching method. Reactions has been chosen as a follow-up to the first three categories. The annotated selections in this section have included articles written by experts, in the field of mathematics or other educational areas, who have theoretically evaluated the Chisanbop program. After becoming aware of the Chisanbop method through the categories already mentioned, it was hoped that from the data collected in the final category, Research Findings, some generalizations about its effectiveness could be made.

It was the intention of the annotator to have a greater number of articles containing data included in the bibliography. Since listings in the Educational Index and other available sources did not contain any data studies on the relatively new topic of Chisanbop, the annotator wrote to program directors believed to be working on research projects. Results of their findings were requested.

The limited number of responses has possibly been the result of several factors. The information regarding the names of directors may have been incorrect. The studies may not have been completed as of June 20, 1980. The vacation schedule of educators during the summer monthes has been considered as a third possibility. This inability to obtain additional information regarding research studies has been considered a limitation of this paper.

ANNOTATED BIBLIOGRAPHY

HISTORICAL BACKGROUND OF FINGER COUNTING SYSTEMS

Jones, Philip, "Tangible Arithmetic IV: Finger Reckoning and Other Devices," Mathematics Teacher 48:153-57, March, 1955.

Jones included in his article an illustration of finger symbols which "were once used to communicate at international fairs and as an aid in remembering numbers when using the abacus." Jones discovered this illustration in a book entitled, Arithmetice, published in Florence in 1518. Finger symbols existed in Greece as early as the fifth century B.C. and in China during the time of Confucius (551-487 B.C.). Jones mentioned the use of fingers for performing the multiplication on intergers between 5 and 9.

Menninger, Karl, Number Words and Number Symbols, translated by Paul Broneer, Massachusetts Institute of Technology Press, Cambridge, Mass., 1969, 480 pp.

Menninger devoted pages 201-220 to "Finger Counting." An account was given of Venerable Bede, an English Benedictine monk who lived during the early Middle Ages. "We have him to thank for the only complete record of finger counting in existance."

Ancient methods were explained. The importance of finger counting in the seaports and market places of the Red Sea, Arabia, and East Africa was mentioned. A description was given for the computation of multiplication problems using the integers 6 through 9.

Richardson, Leon, "Digital Reckoning Among the Ancients," American Mathematical Monthly 23:7-13, January, 1916.

Richardson's article was divided into three sections. The first contained quotes from ancients who used finger movements to represent numbers. A list giving the finger positionings for forming the numbers less than 100 was included. The second part of the article told of the use of fingers in counting and reckoning. The remaining section dealt with the four operations represented by the use of the fingers.

INSTRUCTIONAL MATERIALS

Commission on Textbook Adoptions, 1979 Adoptions in Mathematics, Indiana, State Board of Education, Indianapolis (?), 1979, 11 pp.

Mathematics textbooks, adopted on December 14, 1979, for the adoption period of July 1, 1980 through June 30, 1985 were listed. The Complete Book Of Fingermath by Lieberthal and Fingermath: Book 1 by Gurau and Lieberthal were found on page 9.

Gurau, Peter, and Lieberthal, Edwin, Fingermath: Book 1 Teacher's Edition, McGraw-Hill Book Co., New York, 1979, 247 pp.

Objectives, warm-up activities, boardwork activities, book activites, and whole class activities were suggested in this edition. A total of 99 objectives were introduced. Miniature samples from the pupil's text were found on corresponding pages. The suggested teacher's dialogue for whole class activities was printed in red.

Gurau, Peter, and Lieberthal, Edwin, Fingermath: Book 1, McGraw-Hill Book Co., New York, 1979, 147 pp.

Activities and computational drill pages were collected in this pupil's workbook. Some illustrations of the finger positionings were found. Operations practiced were primarily addition and subtraction. A few multiplication readiness problems were located on the last six pages.

Gurau, Peter, and Lieberthal, Edwin, Fingermath: Book 2 Teacher's Edition, McGraw-Hill Book Co., New York, 1980, 232 pp.

A total of 201 lessons were introduced in this teacher's edition. Each lesson contained a warm-up activity and a book activity. Whole class activities were found in certain lessons. Recommended finger drill exercises were given. Several lessons referred the instructor to pages in the Complete Book of Fingermath by Lieberthal. Suggested teacher dialogue was printed in blue. Miniature samples of the corresponding pages in the pupil's book were given. Questionnaires entitled "Research Response" were found in the middle and at the end of the book.

Gurau, Peter, and Lieberthal, Edwin, Fingermath: Book 2, McGraw-Hill Book Co., New York, 1980, 183 pp.

Activities and computational drill pages were collected in this pupil's workbook. Skills introduced were basic addition, basic subtraction, addition requiring regrouping, subtraction requiring renaming, and basic multiplication.

Lieberthal, Edwin, The Complete Book Of Fingermath, McGraw-Hill Book Co., New York, 1979, 342 pp.

This book was written for parents, teachers, and/or students to explain the basics of the finger calculation method. A step by step explanation of the process was described. Diagrams of finger positionings could be found on most pages. The finger positionings and terms (such as press and clear) appeared to be consistent with the Chisanbop method developed by Pai. One difference was noted. Fingermath referred to the number 10 as "ten" where Pai used the term "onety."

Lieberthal, Edwin, Home Study Book: Chisanbop Finger Calculation Method, Van Nostrand Reinhold Co., New York, 1978, 80 pp.

This book was developed as a guide for those instructing beginners in the Chisanbop method. The basic step by step process was explained. Illustrations of finger positionings were given. It is stated that those people completing this home study book will be capable of performing basic addition, multi-digit addition (handling unlimited columns of numbers), and basic algebra addition (missing addends) using the Chisanbop process.

Lieberthal, Edwin, Home Study Workbook 1: Chisanbop Finger Calculation Method, Van Nostrand Reinhold Co., New York, 1978, 96 pp.

This workbook, consisting of drill pages, was designed to be used with the Home Study Book: Chisanbop Finger Calculation Method by Lieberthal.

Pai, Hang Young, Parent's Guide to "Chisanbop" Finger Calculation Method, Chisanbop Enterprises, Inc., Bronxville, New York, 1978, 67 pp.

Pai suggested that this book be used as the starting point for everyone wanting to learn Chisanbop. The background of the method and directions for the use of the book were given. Two recordings accompanied the text to further explain the finger positionings. Illustrations were found on most pages. Stage 1 skills in addition, algebra (missing addends), and multiplication were practiced in this book. Stage 1 involved counting each number one unit at a time.

Pai, Hang Young, Chisanbop Workshop, Chisanbop Enterprises, Inc., Bronxville, New York, 1979, 80 pp.

This book was designed as a workbook to be used by teachers attending a training seminar conducted by a certified Chisanbop instructor. All strategies in the Chisanbop finger calculation method were explained during the course. This workbook provided practice problems for the strategies.

Pai, Hang Young, chairman, Teaching Sequence of Chisanbop Stage by Stage by Stage, Chisanbop Enterprises, Inc., Bronxville, New York, 1979, 28 pp.

Teachers who had completed training in the Chisanbop finger calculation method were mailed this article. It was developed as a supplement to the teacher's manual received at the training seminar. A review of the four stages and a sequence for teaching skills were given.

Pai, Hang Young, and Pai, Sung Jin, creators, Pupil's Workbook: Chisanbop Finger Calculation, Stage 1 Addition, Chisanbop Enterprises, Inc., n.p., 1977, 102 pp.

A collection of drill pages for Stage 1 addition were found in this pupil's workbook.

Pai, Hang Young, and Pai, Sung Jin, creators, Pupil's Workbook: Chisanbop Finger Calculation, Stage 2 Addition, Multiplication, Chisanbop Enterprises, Inc., n.p., 1977, 110 pp.

A collection of drill pages for Stage 2 addition and multiplication were found in this book.

INFORMATIONAL ARTICLES

Brooks, Andree, "Fingers Make a Comeback in Math," New York Times, January 8, 1978, sec. 13, p. 19.

Brooks described a classroom setting in a New York school. The children observed were practicing the Chisanbop method of finger calculation. A brief background of the origins of Chisanbop and its Korean creator, Pai, were given. Mentioned was Pai's own use of Chisanbop while working in a part-time capacity as a mathematician for a New York firm of tax accountants. School children, as well as the math coordinator of the Mount Vernon, New York schools, were quoted for approval of the method.

Brooks, Andree, "Chisanbop," Times Educational Supplement, July 7, 1978, pp.24-25.

Brooks attended a session to train teachers in the Chisanbop method in New Rochelle, New York. He mentioned that a pilot program for children was also taking place in that area. He noted that there was "fear among the more conservative math establishment that the phenomenon was going too far too fast." Information regarding the funding for a three year in-depth study of Chisanbop by Lamon at the University of Oregon was given.

Carlyle-Gordge, Peter, "Let Your Fingers Do the Counting," Maclean's 92:37, January 8, 1979.

Carlyle-Gordge provided his readers with a story of a Winnipeg teacher who drove to Dallas to attend a Chisanbop training session. The teacher, Margaret Froese, had said, "It's much more personal than using beads or popsicle sticks and gives them (her students) a concrete grasp as well as a visual one of what's happening. The important thing is to follow the system exactly as laid down by Mr. Pai."

Fein, Elaine, "Counting on Chisanbop," Seventeen, 38:66, March, 1979.

Fein has given her readers a few basic steps which will enable them to perform a simple addition problem using the Chisanbop technique. Mentioned is the fact that it takes approximately thirty hours of instruction to fully master Chisanbop.

Hinchion, Gail, "Children 'Calculate' with Fingers," South Bend Tribune, November 5, 1979, p. 23.

Photographs showing pupils of the Hay Elementary School in South Bend, Indiana, accompanied an article which informed readers of the Chisanbop finger calculation method. It was stated that South Bend teacher, Lois Hains, had applied for a mini school corporation grant to offer teachers training in the method.

"Now It's OK to Count on Your Fingers," Instructor 87:72, May, 1978.

A brief explanation of the finger positioning and a sample of a simple calculation technique for the Chisanbop method was given. The article said that a testing program was underway in the Mount Vernon, New York schools.

Pearson, Craig, "Do You Know How to Chisanbop?" Learning 7:134-8, August/September, 1978.

Pearson gave a brief description (with illustrations) of the positioning of the fingers and the counting method. The article gave a slight background of Chisanbop's roots in Korea and its introduction in the United States. The teaming of Pai with marketing specialist, Lieberthal was mentioned, as was the television advertising campaign that followed. Pearson stated," In Chisanbop's case, research analyses will be a long time coming, puffing to catch up to a spontaneous wave of demand generated largely by parents who saw Chisanbop on television."

Rollins, N.G., "Newest New Math - Chisanbop," Goodhousekeeping 187:221, August, 1978.

Illustrations assigning the numerical value of the fingers accompanied this article. Rollins described the procedure for calculating a simple addition problem using the Chisanbop method.

REACTIONS

Jordan, James, An Opinion About Chisanbop, Mathematics Department, Washington State University, Pullman (?), n.d., 4 pp.

Reservations regarding the use of the Chisanbop method were given. Jordan felt that the resemblance of the fingers to Roman numerals and the complexity of higher level multiplication operations posed problems. He also felt that the thumb's representation of five could lead to misconceptions in the minds of younger children. Concerns about the use of the method with left-handed and physically handicapped children were expressed.

Wilson, James, "Chisanbop - Sales Hype or Substance?" Reflections, Georgia Council of Teachers of Mathematics Newsletter, September, 1978, pp. 1, 6.

In this article Wilson gave his reactions to a Chisanbop demonstration which took place during the 1978 meeting of the National Council of Teachers of Mathematics in San Diego. He warned, "The proper attitude for us as mathematics teachers is to be cautious, learn all we can about it, and make informed decisions. But the basis of informed decisions should come from open discussion and documentation of the method and its results - not from media blitz and sales hype." Wilson went on to list five questions a school system should raise before adopting the Chisanbop method.

"Some Questions on Chisanbop," EPIEgram: Materials 7:1-2, February, 1979.

This article in the educational consumers' newsletter gave some background of Chisanbop and its creator, Pai. It listed the questions that Wilson of Georgia suggested a school system should raise before considering adoption of the finger calculation method. The article provided readers with an opportunity to respond to Wilson's questions and to comment on additional aspects of the Chisanbop method.

"A Few Cheers for Chisanbop," KPIEgram: Materials, 7:3-5, May, 1979.

In this edition of the educational consumers' newsletter it was reported that three responses to Wilson's questions were received. A positive comment was reported from a Greenville, Illinois teacher. A remedial math specialist from Drexel Hill, Pennsylvania expressed "that Chisanbop could best be used by the elementary teachers of gifted children as additional enrichment of their math experiences." Owens, a mathematics consultant of Kilgore, Texas, followed Wilson's format in answering the questions. Responses were generally favorable for the use and instruction of Chisanbop. He mentioned that the training costs were excessive. Owens also felt the need to develop his own materials to supplement the program.

Greenwood, Jay, "Critique on the Chisanbop Finger Calculating Method," Arithmetic Teacher 26:18-21, March, 1979.

After attending a two week workshop on Chisanbop at the University of Oregon in Eugene, Greenwood stated his reactions. He was concerned that young children who have not yet conceptualized the number five could have difficulties. (In Chisanbop the thumb represents five units.) Greenwood mentioned that at the time his article was written, existing data have not been collected to support or reject the claims made by Chisanbop Enterprises.

Knifong, J.Dan, and Burton, Grace, "Chisanbop: Just Another Kind of Finger Reckoning?" Arithmetic Teacher 26:14-17, March, 1979.

Authors Knifong and Burton pointed out the history of other methods of finger reckonings. The article discussed several methods of ancient times. Illustrated examples of problems calculated in Chisanbop were shown. Possible advantages in defense of teaching Chisanbop were critiqued.

Zaslavsky, Claudia, "It's OK to Count on Your Fingers!" Education Digest 44:57-9, April, 1979.

Zaslavsky stated, "At last finger counting is coming out from under the table and is being recognized as a positive and natural practice." In this article she mentioned the significance of finger gesturing among some of the African cultures and native American cultures. A slight history of finger counting among the ancient Chinese, Egyptians and Romans was given.

Zaslavsky stated that finger calculation had been criticized and referred to as a crutch. She defended the method by saying, "Observation and common sense show that a person does not solve a problem by a cumbersome method when a simple one will do the job. Children will dispense naturally with concrete materials as soon as they can."

RESEARCH FINDINGS

Lamon, William, An Investigation of the Effects of the Use of Chisanbop, Psychological Research Laboratory for Mathematics Learning, College of Education, University of Oregon, Eugene, n.d., 10 pp.

Lamon's work was a proposal to begin an in-depth research project on the finger calculation method developed by Pai. Related research findings in the area of manipulative aids and techniques in the teaching of mathematics were reviewed. Brief summaries of many previous studies were given.

He concluded that firm generalizations could not be made regarding the use of manipulatives. He also stated the the results from studies involving techniques or novel methods of teaching mathematics had produced information of little value to teachers and had not improved the learning and achievement conditions of elementary school children. Since no solution had yet been found, Lamon wished to proceed with a study on the finger calculation system; "...the Chisanbop method may represent a successful remedy for this problem."

Lamon, William, project director, Assessing the Significance of the Finger Calculation Technique as a Pedagogical Tool in Arithmetic Instruction, Psychological Research Laboratory for Mathematics Learning, College of Education, University of Oregon, Eugene, June, 1979, 15 pp.

This study was conducted during the 1978-79 school year in the states of Washington and Oregon. First, second, and third grade pupils were involved. Thirty teachers, trained in finger calculation method, participated in the program and were asked to complete questionnaires. "While pre-tests and post-tests were obtained from both control and experimental groups, such data could not be analyzed and synthesized in a valid and reliable manner. Therefore, the report is limited to findings as analyzed and synthesized by the questionnaires."

Lamon concluded that the desirability and effectiveness of this method varied. Also, he stated, "...once the mechanics of the technique are mastered, its use for the solution to computational tasks and understanding of the concepts involved is comprehensive, useful, easy and simple, stimulating, clear, interesting and valuable."

Texas Education Agency, Use of Finger Calculation in the Elementary Classroom, Texas Education Agency, Austin, 1980, 19 pp.

In the fall of 1978 a program was initiated in Texas to collect data on the effectiveness of finger calculation as a teaching method. Pupils from Grades 1, 2,3, and Remedial 5 participated in the program. Evaluation instruments were designed to measure accuracy and understanding but not speed. Classroom teachers were directed to spend approximately 10 hours of instruction over a period of 60 days. Results from the posttest showed the most significant gains for Grade 1 in the areas of concept, addition and subtraction, for Grade 2 in addition, and for Remedial 5 in math sentences. Although these results were significant, they were not overwhelming. Responses from teacher questionnaires were included in the report. "Care should be taken in making generalizations from the results, because many variables were not controlled for in the study."

CONCLUSION

The value of the Chisanbop finger calculation method has been investigated through annotated articles. Most would probably agree that the results of the available research are insufficient. Additional data, collected to determine the technique's effectiveness, are needed. It would be helpful to have a longitudinal study conducted to establish the role a finger calculation method might have in the retention of computational skills.

As educators, we must be careful not to jump on every bandwagon that comes along. On the other hand, there are as many learning styles as there are students. We should be skilled in a variety of teaching techniques in order to meet individual needs.